Summary of the information workshop on September 27th, 2012 in Berlin

Soot, Ozone, Methane: Underestimated Climate Forcers and their Impacts on Climate, Health and Economy

Compiled by Julia Schmale in cooperation with the presenters and organizers

The workshop organized by the campaign "Soot-Free for the Climate" and the Institute for Advanced Sustainability Studies e.V. addressed a selection of topics related to short-lived climate-forcing pollutants (SLCPs), in particular soot, as well as ozone and methane, that were informatively presented and open for public discussion.

SLCPs contribute significantly to climate change. However, all presenters stressed that their reduction is not a substitution for CO_2 reducing measures. Aside from their effects on the climate, SLCPs also have negative impacts on human health and eco-systems and therefore need to be discussed in a broader context. Although the health impairments of ground-level ozone and particulate matter, including soot, have been known for decades, the general public is not yet connecting them with global warming.

Therefore, at this recent workshop, the discussion focused mainly on the role of SLCPs in climate change. The **most important messages from the presentations** are as follows:

Effect of SLCPs on:

- the climate: SLCPs have warming as well as cooling effects. Soot, ozone and methane together are responsible for approximately one-third of the human-made climate change and therefore contributed considerably to the rapid increase in the global average temperature over the past decades. If emissions of SLCPs continue to increase, this rapid temperature increase could trigger irreversible processes in the near future, like the melting of glaciers, which would make it impossible for humans and nature to adapt without great losses. SLCPs have a relatively short lifespan in the atmosphere, from a few days (particulate matter) to a few months (ozone) to several years or decades (methane, HFCs), so positive effects from their reduction will quickly be noticeable.

- health: In 2010, ozone and especially particulate matter, including soot, were responsible for reducing the average life expectancy in Germany by about 7.5 months. They were also the cause of many respiratory and cardiovascular diseases. In addition, the World Health Organization (WHO) classified soot, along with other components of particulate matter, as carcinogenic.

- ecosystems: In Germany alone, SLCPs are responsible for crop losses worth hundreds of millions of Euros. Natural ecosystems are also sensitive to the pollution and this in turn has negative consequences for habitats and bio-diversity.

Contributions of soot and methane emissions to climate change:

- Global sources: Emissions of methane and soot from agriculture are computed to be responsible for about one-third of the global warming due to SLCPs, waste management emissions are accountable for approximately one-quarter, followed by emissions from private households with close to 20%. Traffic currently contributes less than 10%. Note that this breakdown is only with regards to the climate forcing effects; the impacts of the different sources on health and eco-systems are distributed differently.

- Contribution of the OECD countries: Globally, the OECD countries contribute close to 20% to the climate change from soot and methane emissions. Of that portion, emissions from private households (wood-burning) and traffic contribute approximately 30% each and "off-road traffic" is responsible for about 20% of the emissions. Forecasts for the year 2030 estimate that households will then produce more than 50% of the emissions while "road" and "off-road" traffic will be responsible for approximately 10% each.

- Emissions in Germany: Currently, road traffic is responsible for over 50% of the warming effect from soot and methane emissions, followed by the contribution of private households of approximately 30%. The use of machinery such as e.g., for construction is responsible for almost 20% of the warming. By 2030, the distribution of the emissions will approximately be the same as the distribution in the OECD countries as a whole.

Measures against soot and methane emissions:

- Measures in the OECD countries: Emissions can be reduced especially by switching furnaces and stoves in private households to pellet heaters as well as adding particle filters to diesel engines of vehicles, ships and construction machines.

- Road traffic: Technical solutions for the transportation sector are available and have been tested. Street vehicles, for example private cars and public transportation such as busses could easily be retrofitted. Non-technical solutions, e.g. the increased use of bicycles in the city, are possible and will in addition reduce the emissions of carbon dioxide. Copenhagen is a positive example for this approach: 37% of the citizens are using bicycles as their mode of transportation to work or school.

- Off-road traffic: There are also a multitude of options for retrofitting construction machines and agricultural equipment with particle filters, even though individual cases need to be checked and adaptive solutions implemented.

- Rail traffic: Locomotives can also be equipped with particle filters. Better implementations for technology-based solutions for railcars still have to be developed.

- Maritime traffic: Technologies for emissions control, including particulate filters, are also available for ships. Specific implementation solutions, however, have to be developed for each individual case.

- Private households: Emissions, in particular from wood-burning stoves, can readily be reduced. A variety of filters are currently available that can be put in place. In Germany, the current legislative measures for wood-burning are not effective for soot emissions.

- Effects of such measures: Due to the short lifetime of SLCPs, the positive effects can be noticed within a few weeks to years. In addition, the positive results will occur and be noticeable directly where local measures were deployed.

Germany's roles in the international context:

- Further reduction of SLCPs in Germany, too, would be necessary to minimize the impacts on health and climate.

- For the sake of climate change, Germany's national SLCP reduction efforts can be considered to be of symbolical nature on a global level. On the other hand, continued efforts within Germany to reduce SLCPs will have a direct, positive regional impact on health, agriculture and ecosystems. Furthermore, due to already implemented measures to reduce SLCPs and anticipated future implementations, Germany has developed a large know-how, which can be exported. This know-how is not limited to technological solutions, but also includes process knowledge, which reaches from the identification of sources and the involvement of stakeholders to the creation of framework conditions for the implementation of measures to minimize the effects of SLCPs.

- The awareness of the need to reduce SLCPs and first initiatives on a global level are still young and require careful consideration about which measures should be implemented, especially due to the current state of the UNFCCC climate negotiations. Germany as a member state of the Climate and Clean Air Coalition, whose main goal is the global reduction of SLCPs, in particular soot, methane and HFCs, has the responsibility to take care that measures are chosen wisely and are not, under any circumstances, in competition with or working against current or targeted carbon dioxide reduction measures.

During the question & answer segments and the **panel discussions**, the following points emerged as being relevant.

- Long-term and integrated solutions are needed: The deployment of "end-of-pipe" technologies, e.g. particle filters in the traffic sector, can quickly lead to a reduction of SLCPs, especially particulate matter including soot and sulfur dioxide. But considerations for sustainable concepts, which address not only parts of the problem but all aspects of it, both technology- and behavior-oriented, are needed. This includes efforts to reduce SLCPs and carbon dioxide simultaneously. Most of the time, this cannot be achieved by installing "end-of-pipe" technologies but requires the implementation of different front-end technologies. Generally, completely eliminating the emissions would require more radical measures, such as considering the possibility/feasibility of a mobility concept without combustion engines in the future.

- Internalization of external costs: It is not expected that international limit values for carbon dioxide and various SLCPs will be adopted and followed universally by all significant emitter-

nations in the near future. Therefore, a possible way to achieve the reduction would be an economic approach which internalizes external costs.

- Responsibility: On a European level, the key to the reduction of SLCPs is located in Brussels, because other areas besides climate and environmental protection, e.g., trade within the EU, are also affected. Appropriate regulations for construction machines and standards for stoves (in private households) are not pending yet. This will require the pressure of the member states. Nationally, various ministries have to take on their responsibilities: e.g., the ministry of transportation for emissions from traffic, the ministry of economic affairs and the ministry of labor for construction machines, the environmental ministry for climate and eco-system protection, the ministry of health for the protection of human health etc.

- Financial questions: In principle, the originator is responsible for the cost. With regards to traffic, this principle could be implemented by charging road tolls. In other areas, financial incentives or assistance for retrofitting could be considered, e.g., for stoves in private households.

- Are we prepared for climate changes in the near future? SLCPs have direct impacts on the air quality. However, it is still unclear if the reduction, as planned by current legislation, will be sufficient to significantly slow the impending climate change. A changed climate can in turn have a negative effects on the air quality, e.g., through increased temperatures and stagnant high pressure systems, and therefore change the effect of the SLCPs. Another point addressed was the opening of new sea routes due to the melting of the Arctic sea ice in summer. This could have considerable negative direct effects on the environment and accelerate climate change in the North Pole region. In this case, it is very important to determine rapidly whether appropriate legislation is in place or planned, if subsequent regulations are in place or if revisions are needed.